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Cover Story

Tomorrow's New Car Buyers Surveyed

ARE AUTOMAKERS ON TARGET?

One Man's Vision:

Chrysler's Sterling Plant

Inside Japan No. 4

Getting Serious About Machining Centers

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AUTOMOTIVE INDUSTRIES

November, 1984/Volume 164, Number 11

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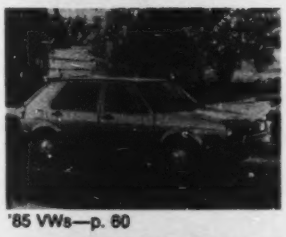

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COVER

A few of Chilton's finest ponder the imponderable for our camera this month. Tipped hats to Chrysler and Buick for use of the New Yorker and Century T-Type.

NEXT MONTH

December brings AI's auto exec interviews, a new "What Plant Where" chart, our annual end of the year analyst predictions and much more.

QUOTABLE

"No thanks, that's really not my style. If you guys did it, I wouldn't get any satisfaction out of it. If I'm going to get violent, I'd want to break his legs myself."—Lee Iacocca, responding to an anonymous, telephoned offer of physical retribution against Henry Ford, after Ford's firing of Iacocca in 1978. A Ford spokesman had told a Detroit newspaper that Iacocca was fired because "the son of an immigrant born in Allentown, PA, is a long way from Grosse Pointe." Exerpted from the new book "Iacocca, An Autobiography," by Lee Iacocca and William Novak, Bantam Books.

"Do you know what would happen if I sent some young engineers over to GM to learn? They would come back spoiled! For every bit of test equipment we have, they have 15. For every instrument, they have 25 computers!"—Dr. Fritz Naumann, director of vehicle testing, Audi AG.

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Tomorrow's New Car Buyers Surveyed

ARE AUTOMAKERS ON TARGET?

AI's exclusive survey of future new car buyers reveals what today's 18 to 30 year olds like and dislike about the current crop of cars, options, safety features and prices.

by Lindsay Brooke and Jennifer G. Mintzer

When the world's automotive marketeers look down the road at their future customers, what trends do they see? *AI* recently surveyed a random sample of 18 to 30 year old Americans to find out what makes of cars, kinds of options, and special features will be whetting the collective appetite of this segment of the buying public over the next three years and beyond.

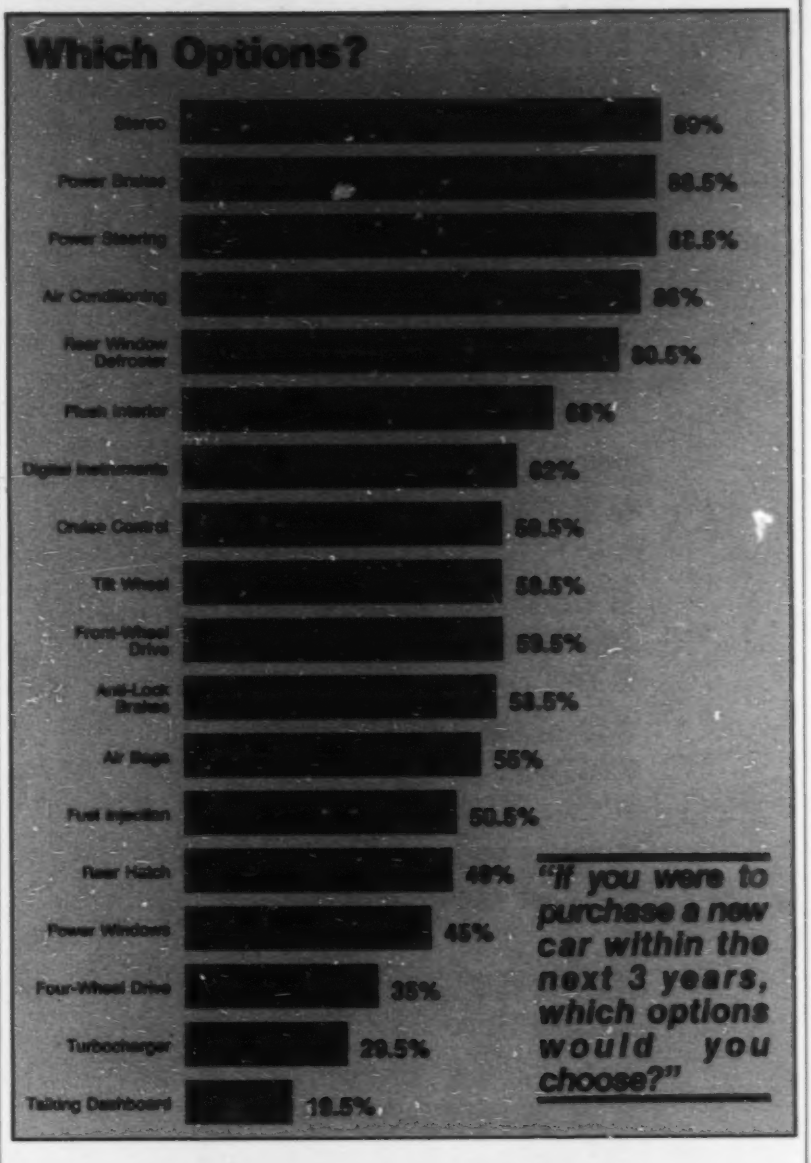
Plus, we asked some of the nation's foremost marketing firms for their interpretations of the data. You may be surprised by the results.

Who's On First?

Not surprising, however, is General Motors hitting the jackpot in our preference study: by totaling all its divisions, the company was a hit with nearly half of all 18-30 year olds surveyed. (See chart, "Which Make?")

Our survey further showed that men and women clearly differ in many of their automotive tastes. The sexes agreed on the first two choices of which car they would buy, but there the similarity ended. After Chevrolet and Ford, women ranked their choices in this order: Datsun (9.2%); Toyota (8.2%); Olds (6.1%); Pontiac (4.1%). Men preferred, starting with third place, Buick (6.9%); Toyota (5.9%); Pontiac and Honda (tied at 4.9%).

Vehicle makes aside, what kinds of extras do the different genders want? (See chart "Which Options?") As expected, the favorite extra was a stereo, reaping 93.9% of the women queried versus 84.3% of men. Only slightly behind in importance are power steering, power brakes, air conditioning and rear window defrosters. Power brakes were the No.1 "goodie" de-



sired by men; 92.2% of our male respondents want it above other options.

Give Me A Six

Perhaps reflecting the trend towards more performance in today's driving, nearly half those surveyed want a six-cylinder engine; the rest are divided almost equally between fours and V8s. After the first place six-cylinder, women prefer the four to the V8, while men are just the opposite.

Americans continue to want their car's transmission to take care of the gear shifting chores—but the popularity of manual gearboxes is increasing. More than half of those surveyed will buy a car with an automatic transmission. Another third want a five-speed. Again the genders split: half the males and nearly two-thirds of the females want automatics; another 41% of males want five speeds, while only a quarter of the females do.

Ergonomics and comfort ranked high in importance to about two thirds of our respondents, who want digital dashboards, plush interiors and tilt-wheel steering in their new cars. However, talking dashboards—the current rage among some auto manufacturers—were deemed important by only about a fifth of our overall respondents, and were only slightly more desirable among women than men.

Front wheel drive and fuel injection are on more than half of our respondents' "want" lists. Over two-thirds of the women surveyed will shop for an fwd car, while a little more than half of the men will. Turbocharging gets the nod from only 30% of our total survey. Half of our respondents will be buying a hatchback, custom-look wheels and whitewall tires.

Reliability is the most important reason for buying a new car to 94% of those surveyed. Following closely was safety (83%) and then handling (81%). Next came fuel economy (73%), price (72%) and ease of service (71.5%). According to our survey, women were distinctly more concerned with price and fuel economy than were men; the cost of a new ve-

hicle being an important buying factor to 22% more women than men.

Peterson: Mini-Car Market to Boom

AI also talked with George Peterson, director of automotive programs at JD Power & Associates, about this group's car purchase decision.

According to Peterson, the decision is primarily based on price. "What you're finding is that many of these people are making their first car purchase, whether it's new or used. If their income is below $30,000 per year, they're out of the new car market. The median income for new car purchasers is over $36,000 a year.

"The key is: when do these people make this transition from buying used to new cars? Manufacturers do not have a tremendous number of makes available in the price range this age group can afford," says Peterson.

"The first manufacturers with low-priced cars will best penetrate this market. We see them coming from Japan, Mexico and Spain.

"We see the mini-car market booming. The base retail price for a mini-car should be $4500-4700," says Peterson. He feels the Chevrolet Sprint should be in this price range. "We feel the Chevy Sprint has been artificially priced too high because they don't have enough to sell," continues Peterson. "When the supply catches up, we think the price will fall to this range."

AI asked this 18—30 age group if they would be interested in purchasing a mini-car that gets about 50 mpg and costs about $5000. Over half of our respondents said yes and another 8% wanted more information. In this category more females (about two-thirds of those questioned) than males expressed interest, reflecting again the significantly greater preference women have for fuel-efficiency than do men, according to the survey.

Peterson maintains that some features are important to not just this age group, but to all auto purchasers across the board. "If you list the importance of certain purchase motivators, reliability and dependability are number one. Purchase price is number two or three. Fuel economy is usually number three or four. Quality

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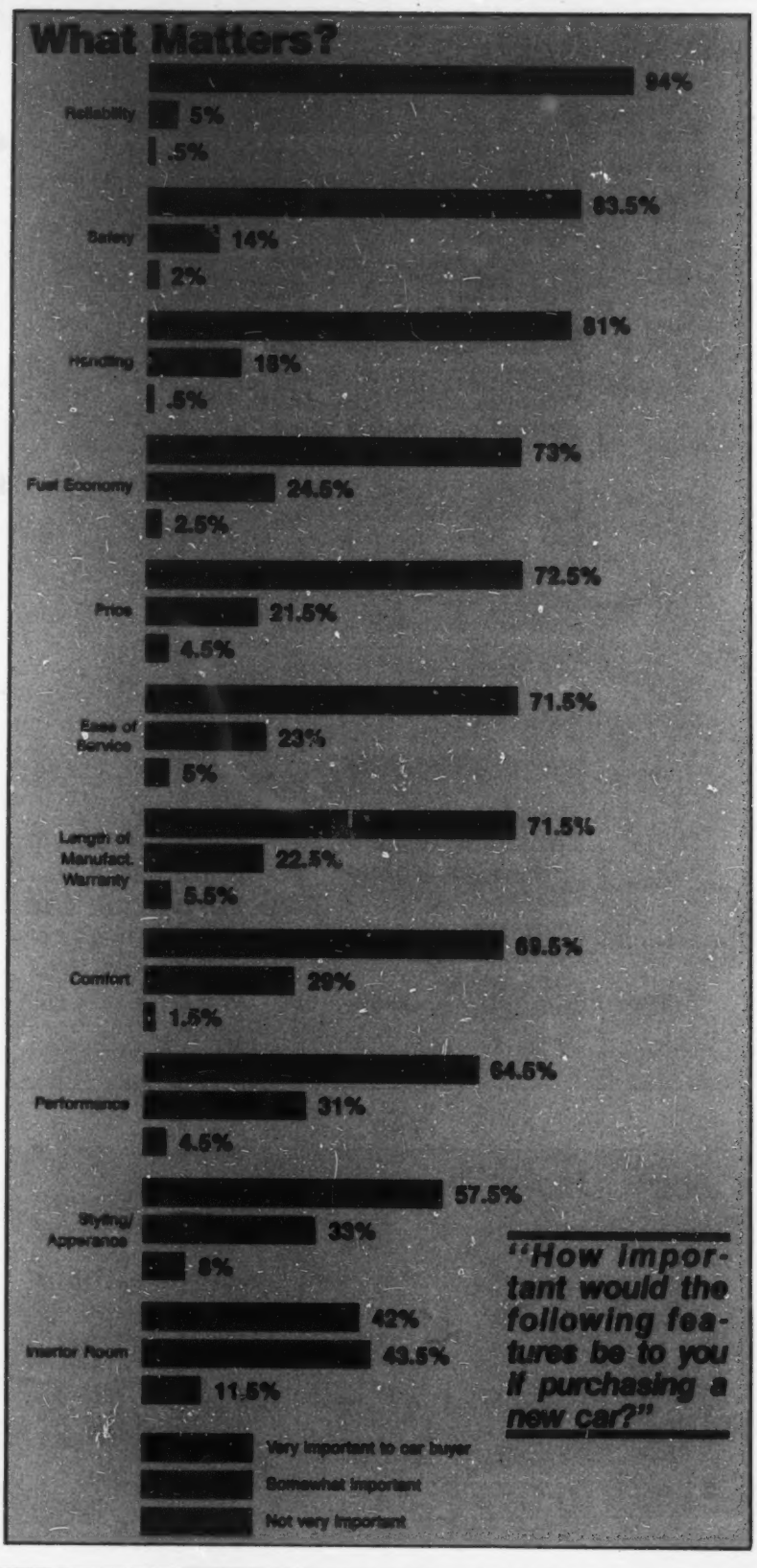
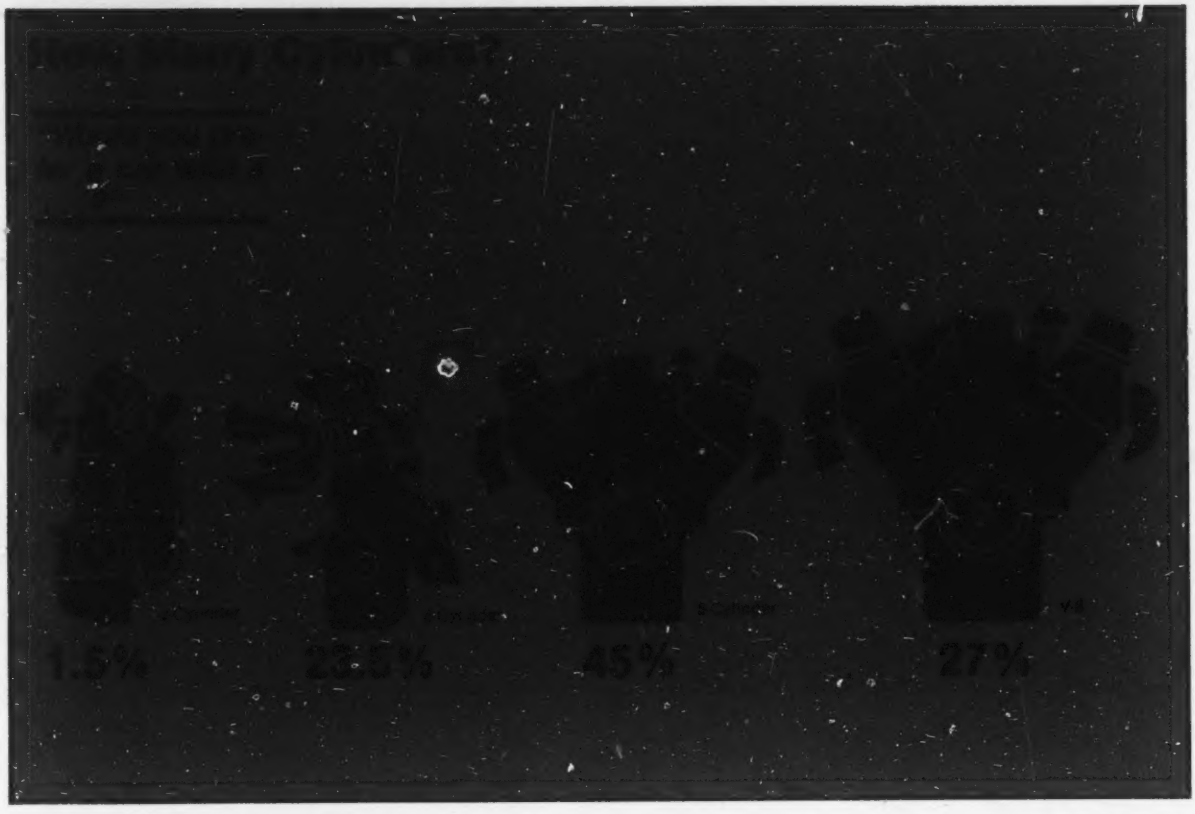




Teenagers: A Gold Mine Market For The Mini-Car?

What about the 27 million American teenagers: do they pack an influential punch on the automotive market? No, says John Hemphill, VP of marketing analysis at JD Power & Associates. "Teenagers have very little influence on new car buying. Less than 1% of new car purchasers are teenagers—that is teenagers who would purchase the car and register it in their own names. Only 5% of 1984 car purchasers are under the age of 25. And precious few are buying new," Hemphill says.

But others disagree. While the number of teenagers in America has declined by 4 million since 1975, "Higher per capita spending is more than compensating for the numerical decline," says Lester Rand, president of the Youth Research Organization, which annually surveys teenage monetary trends.

"Teenagers have increased their personal spending and extended their influence over family and household purchases," says Rand. "Twenty years ago only one out of three teens urged parents to buy products for the home and family. More than two out of three are doing so today."

Among the top four products influenced by teens is the car. According to Rand, "Fifty-four percent of all teens say they are involved in urging parents to buy cars or suggesting what to buy. In addition, 30% of all teens age 16-19 owned a car in 1983."

According to Grady Hauser at Teen-Age Research Unlimited, "3.7% of American teens currently own a new car. In other words, about one million teenagers own new cars. In the next 12 months, our most recent data shows, 1.75 million teenagers say they will buy a new car—either an '85 model or closeout on the '84 model year."

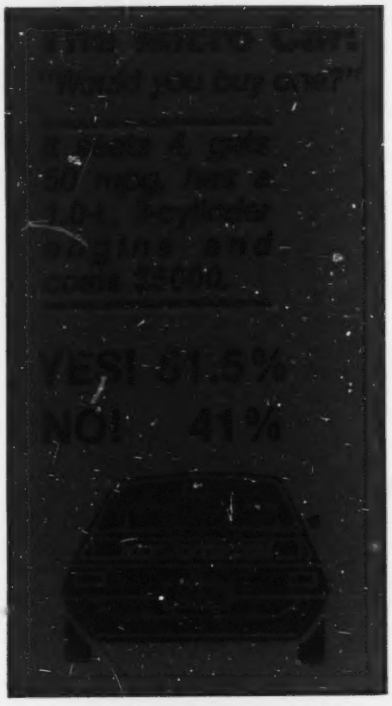
Hauser claims, "Teens as a group are a significant market and are probably going to dispose of $35 billion in the next year."

What are teens looking for in new cars? "Price is the number one priority for teens," states Power's Hemphill. "Affordability is at the top. Performance and styling are more important to them than to other age groups. They are less concerned with safety, comfort and workmanship."

For this reason, says Hemphill, "Teens are less of a factor today (as a buying influence) than in the past, because of rising car prices. The average new car price today is $11,000. Teenagers cannot afford that kind of cash outlay, nor can they get credit.

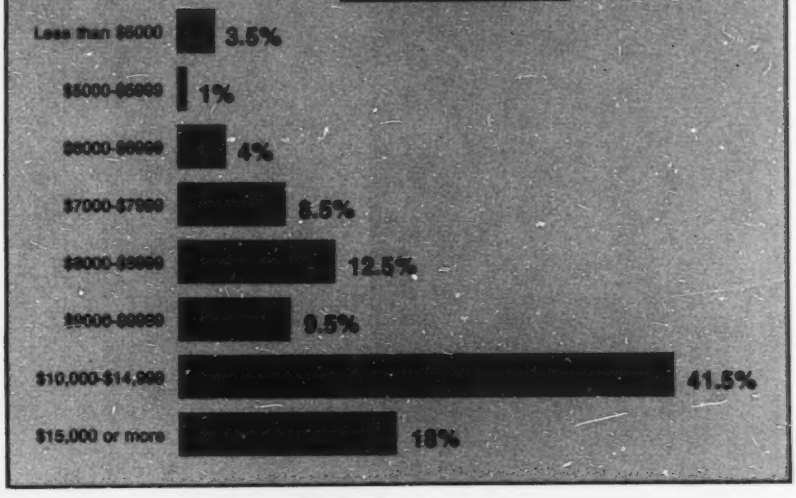
"Once we have more product in the lower priced segment, and we will, teenagers will become relatively more important than they have been in the past. A tremendous teenage market exists for new cars priced in the $3000-5000 segment—the mini car market," says Hemphill.

"Teenagers will be able to buy cars in the mini-car segment. It's analogous to the VW Beetle days. The early success of the Beetle was attributable to parents buying them as a substitute for used cars because of their low price," continues Hemphill. ■—Jennifer G. Mintzer



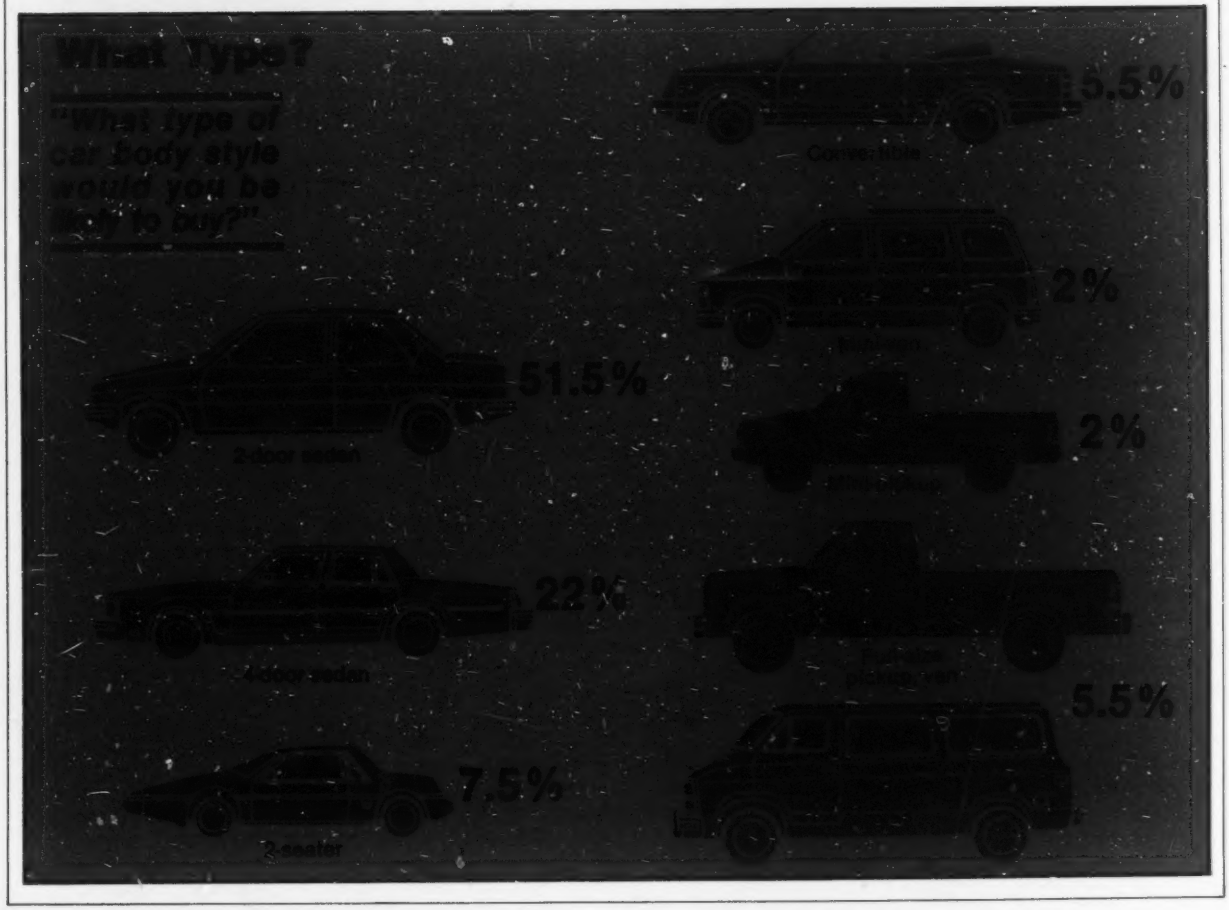
How Much?

"How much would you expect to pay for your next new car?"



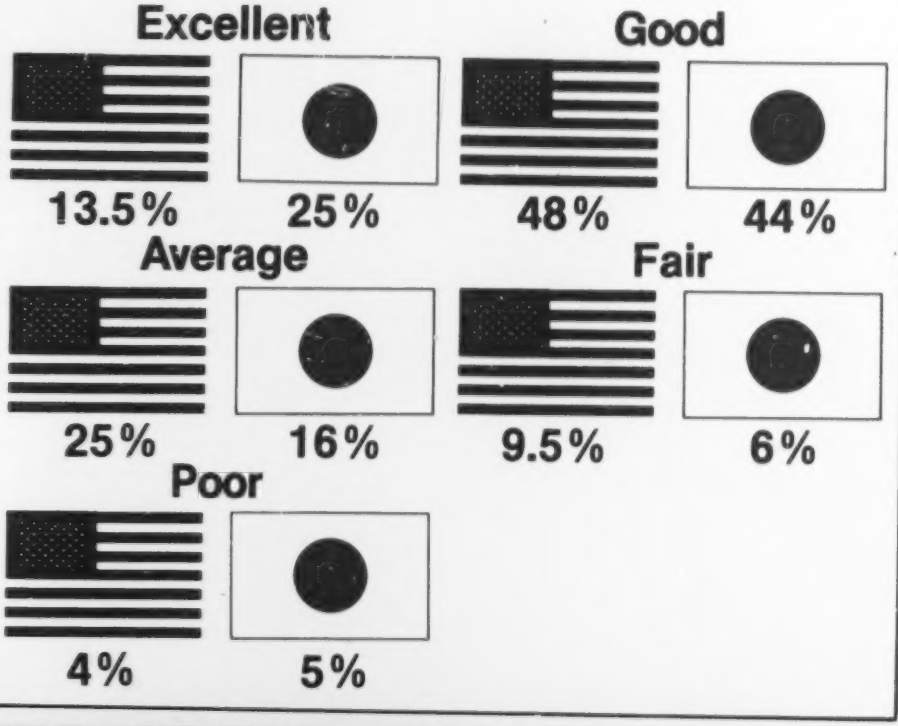
What Type?

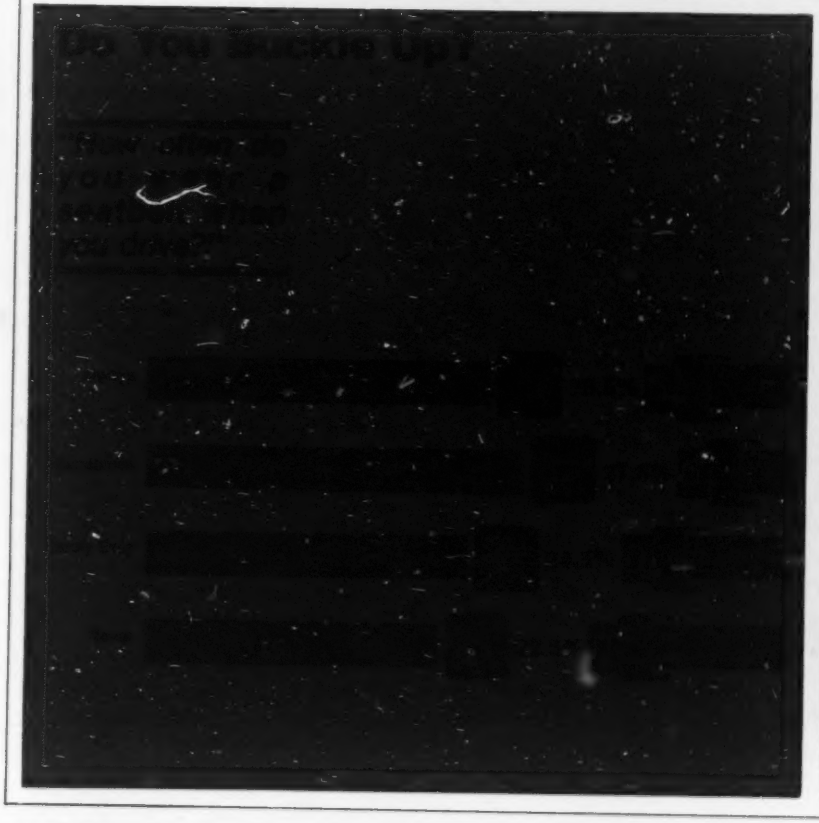
"What type of car body style would you be most to buy?"

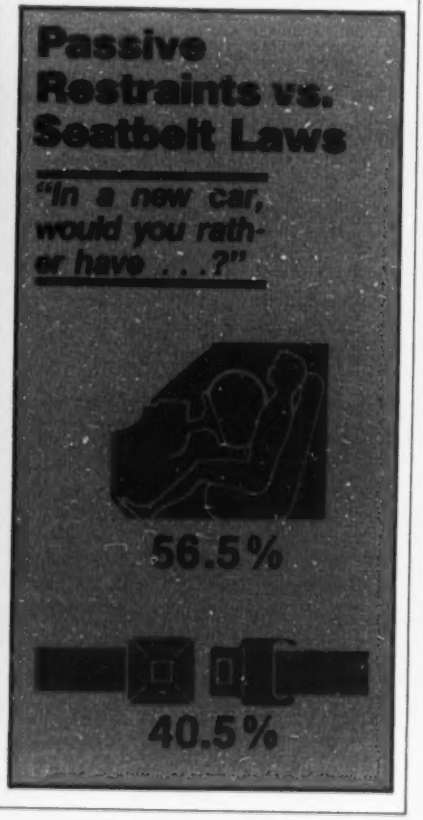


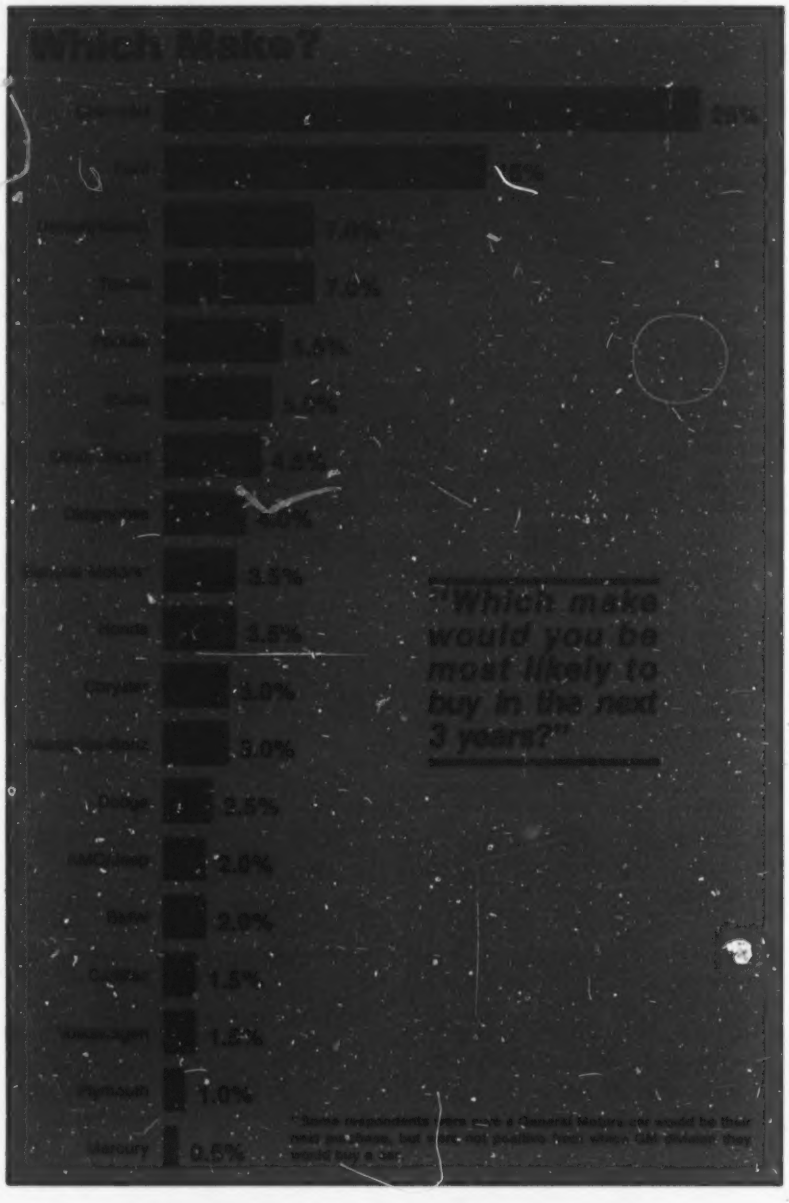
Who Has The Best Quality?

"What are your perceptions of the overall quality of US and Japanese-made cars? Would you say that the quality is . . .?"









is also in the top five," Peterson said.

Are Airbags Wanted?

And what about safety? According to our survey, airbags and anti-lock brakes—which continue to share much national debate and media attention—are important to about two thirds of our respondents. If given a choice between passive restraints and mandatory seatbelt laws, our group would rather *not* be made to buckle-up: 60% opt for factory-installed passive restraints like airbags or automatic seatbelts. Only a little more than half of our respondents now wear their seatbelts all the time or sometimes. More men than women—but only 2%—always buckle up.

"Safety is not a purchase motivator," says Power's Peterson. "Everyone tells you that safety is important to them, but when they actually buy the car, it's not what they look for."

So what are these future car buyers *really* looking for? "From a perception standpoint," says Peterson, "we are seeing a real change in the under-30 age group. They will look for a car that has good space efficiency, that is not particularly ugly to look at, is fun to drive, and relatively fuel efficient. This is dropping to fourth, fifth or sixth place now, until we have the next fuel crisis.

"This group wants a low priced car that's fun to drive with adequate fuel economy, that handles well and is inexpensive to maintain." ■

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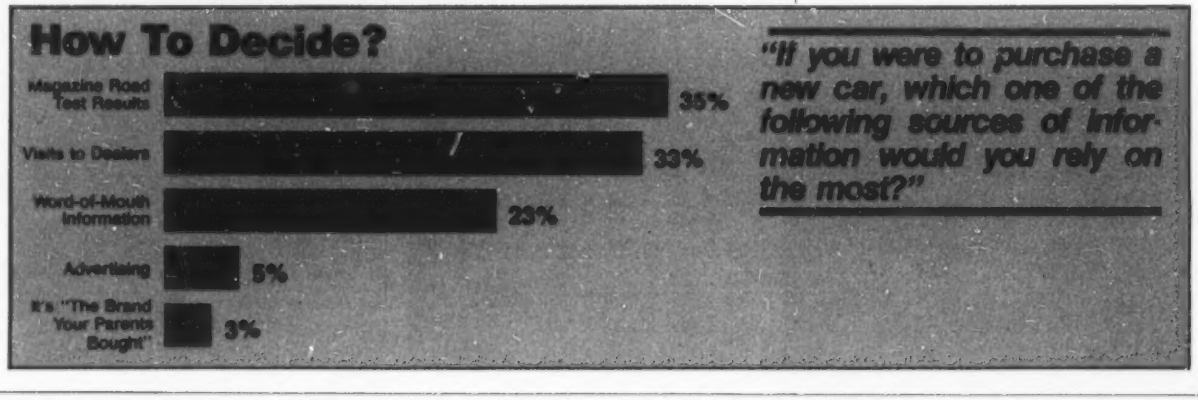


Japanese Machining Centers

QUALITY GOES IN BEFORE THE PART COMES OUT

Japanese automakers, working two shifts and using ancient US machine tools, achieve 90% machine uptime and incredible efficiencies. How do they do it? Try vigilant maintenance, single digit setup times and maniacal quality control.

by John McElroy

It is a dark, cramped old building. "This is an example of the great Japanese auto industry?" I asked myself incredulously as I walked into Toyota's 20 year old Kamigo #9 engine plant.

But appearances can be deceiving.

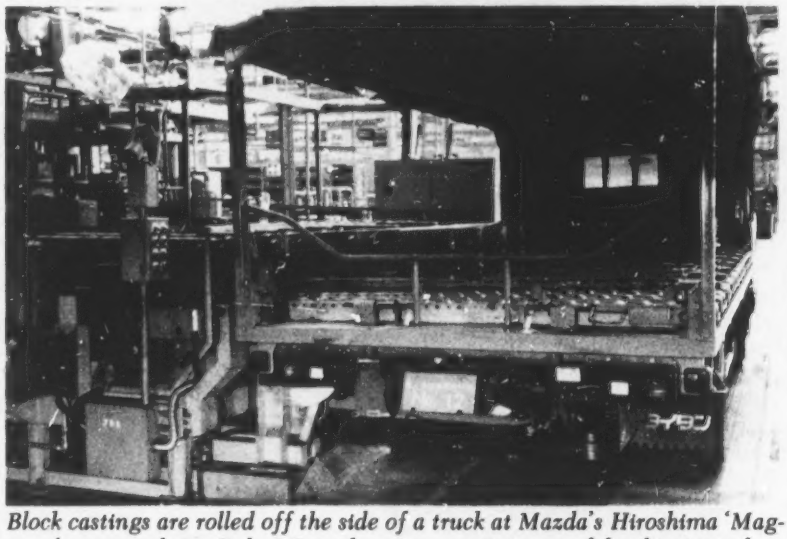
Toyota's #9 engine plant makes over 250,000 four-cylinder engines a year, yet it employs only 180 men working on two shifts. And there is not one robot in the plant. It is probably the most efficient engine plant in the world.

Old American equipment, including Cross transfer lines and machine tools made by Cincinnati Milacron and Ex-Cell-O are jammed into the plant.

"Why are you using American equipment here?" I asked my guide.

"Because when this plant was built it was the best machinery available in the world," he answered.

I scratched my head. How could Toyota take 20-year-old American machinery and achieve higher levels of productivity than the newest US engine plants using the latest computerized machine tools, test equipment and robots?



Block castings are rolled off the side of a truck at Mazda's Hiroshima 'Magnum' engine plant. Only 0.5% of engines coming out of final test need repairs.

Low-Tech Road To Productivity

Well, for one thing, Toyota uses a lot of simple automation. Engine blocks and heads are moved from one transfer line to another by conveyors, and they are moved onto and off the conveyors by simple pick-and-place or lift-and-carry automation (not robots). Crankshafts, connecting rods and caps, and other engine parts are also moved about this way, and they are automatically loaded and unloaded into machines by simple pick-and-place equipment.

But automation is not the secret of Toyota's success. Instead, an almost fanatical devotion to maintenance and quality make the difference. The philosophy in Japanese machining operations is to promote intensive machine tool maintenance programs that achieve over 90% uptime. And at Mazda's Hiroshima engine plant, for example, an equal emphasis on quality ensures that only 0.5% of engines coming out of final test need repairs.

Two-Shift Production

All machining operations in Japan run on two shifts. Typically, US machining operations run on three shifts to achieve what is called high asset utilization. But, around-the-clock operations don't leave enough time for maintenance, so machines break down when they're scheduled to be running. As a result, most US machining operations operate with only 60% uptime, if that. But three shift operations are beginning to go by the wayside even in the US.

At the Kamigo engine plant, for example, the first shift works from 8 am to 5 pm and the second shift works from 9 pm to 6 am. The maintenance crew works on three shifts and does all repair and tool setup between shifts and during the hour-long lunch breaks. As a result, Toyota has very low levels of downtime. And it is able to eliminate in-process inventory that would otherwise be kept on hand to keep the lines running in case a machine breaks down unexpectedly. But even if a machine does break down

(Continued)

unexpectedly, Toyota is ready.

Jidoka

In 1897, Sakichi Toyoda, the founder of the Toyota organization, developed an automatic loom for weaving textiles. The most intriguing part of the loom was that it was designed to stop automatically if the thread broke or ran out. Out of this came Toyota's philosophy of 'Jidoka,' which means 'to make the equipment or operation stop whenever an abnormal or defective condition arises.'

As you might expect, Toyota has retrofitted all of its old American machine tools at Kamigo with simple limit switches and electric eyes. If a machine makes a bad part, if a part doesn't come out of a machine, or if the machine breaks, it automatically shuts off and a giant overhead board that can be seen throughout the plant lights up, identifying what the problem is. The idea is to never let a machine make a defective part, or if it does, to make sure that the defective part doesn't get to the next station. This way, any quality problem is caught at the source.

To Toyota's way of thinking, if a machine is not making perfect parts, it's not working. And since the machines essentially run themselves, one employee can operate several machines at a time, which has made it possible to reduce the workforce and thus the cost of production.

Additional Observations

Reducing tool change time is an important facet of Japanese machining operations. In most cases, they are able to make tool changes in their engine plants in 8 to 10 minutes, including setup time, meaning production only stops for 1 to 2 minutes. Typically, they will change tools about two times a shift. Quick tool change is needed because most Japanese engine plants don't batch produce engines. By producing a variety of engines based on the automobile assembly plant's production schedule, they can supply the assembly plant on an hourly basis.

Generally speaking, the Japanese automakers use automation to do dull, repetitive work. Human beings are used to provide manufacturing flexibility. The final assembly lines are

Toyota's Kamigo #9 engine plant, employing only 180 men on two shifts, makes over 250,000 four-cylinder engines a year.

COMPARING CAPABILITIES

	Toyota Kamigo #9 Engine Plant	Chrysler Trenton	Ford Dearborn
Products:	2.4-L 4-cyl. 2.0-L 4-cyl.	2.2-L 4-cyl. incl. turbo	1.6-L 4-cyl. HO; turbo; EFI
Plant Size:	310,000 ft²	2.2 million ft²	2.2 million ft²
Hourly Employment:	180	2,250	1,360
Line Rate:	1,500/day	3,200/day	1,960/day
Manhours per Engine:	.96 hrs/engine	5.6 hrs/engine	5.55 hrs/engine
Shifts:	2	2	1 assembly 2 machining
Inventory:	4-5 hrs avg.	2.5-5 days avg.	9.3 days avg.
Absenteeism:	5% (scheduled)	3% (AWOL)	N.A.
Relief:	Mass	Mass	Mass
Wages:	$11.35/hour (excluding fringes)	N.A.*	N.A.*
Robots:	None	5	N.A.

Chart by: Automotive Industries

** = Industry average is $12.50/hr excluding fringes*

power and free conveyors that allow the line to operate at the worker's pace. And all inventory for final assembly is placed within arm's length of the line workers so they don't even have to take one step to get the next part they need.

After final assembly the engines go through an automatic 20-minute hot test. At Toyota and Mazda, for example, 99.5% are OK'd the first time through. And most repairs are just a few more final adjustments, not teardowns.

Conclusion

By carefully planning out the layout of their engine plants, the Japanese are able to build very small factories, thus cutting construction costs. Low inventory levels help reduce the need for more floorspace. And they obtain this low inventory level with strict adherence to maintenance and quality programs. As noted, two-shift production and Jidoka increase uptime and eliminate defects.

Quick tool change permits the engine plants to produce a variety of engines and this flexibility allows them to supply their auto assembly plants on a just-in-time basis. All told, this allows the Japanese engine plants to operate at very high levels of efficiency, even with old American machinery.

This could be a valuable lesson for US automakers who think that their only means of becoming internationally competitive is to buy the latest technology. ■

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